

**UNITED STATES
PATENT APPLICATION**

HILL & SCHUMACHER

Title: A SINGLE DRIVE MULTI STAGE DISPENSER

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A SINGLE DRIVE MULTI STAGE DISPENSER

CROSS REFERENCE TO RELATED PATENT APPLICATION

This patent application relates to United States Provisional Patent

5 Application Serial No. 60/422,507 filed on October 31, 2002 entitled A SINGLE DRIVE
MULTI STAGE DISPENSER which is incorporated herein by reference.

FIELD OF THE INVENTION

This invention relates to dispensers and in particular multi stage

10 dispensers.

BACKGROUND OF THE INVENTION

Machines for delivering blank cards or paper stock from a stack are well
known. As well such machines that can deliver the cards or paper to a demand
15 location are well known. These machines are typically multi staged machines that use
a plurality of drives for individually controlling the different stages.

In contrast the present invention uses a single drive to control a multi
stage dispenser.

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SUMMARY OF THE INVENTION

The dispenser of the present invention is for delivering product such as
cards, paper stock or the like product to a demand location. The dispenser includes a

product hopper for a plurality of product; a feed belt for receiving the product; at least two feed assemblies; and a drive motor operably attached to the feed belt and each feed assembly.

5 The dispenser of the present invention is for dispensing singular paper products from a stack to a transfer conveyor that would typically include pusher flights. The dispenser has multiple stages that are driven by means of a single drive motor. Some of the stages are geared up to create larger spaces between the products being transferred. The dispenser of the present invention is designed with shared shafts for the various stages, which enables short and narrow products to be dispensed.

10 Further features of the invention will be described or will become apparent in the course of the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described by way of example only, with
15 reference to the accompanying drawings, in which:

Fig. 1 is a side view of the dispenser constructed in accordance with the present invention, showing the timing belt and product drive belts;

Fig. 2 is a plan view of the upper drive belt of the dispenser of the present invention;

20 Fig. 3 is plan view of the lower drive belt of the dispenser of the present invention;

Fig. 4 is a side view of an alternate embodiment of the dispenser of the

present invention wherein the drive motor is directly connected to the third stage drive shaft;

Fig. 5 is a perspective view of a second alternate embodiment of the dispenser of the present invention wherein the drive motor is directly connected to the third stage drive shaft and further including interchangeable gears;

Fig. 6 is a perspective view of the second alternate embodiment of the dispenser as viewed from behind the product hopper;

Fig. 7 is a perspective view of the second alternate embodiment of the dispenser as viewed from underneath the dispenser.

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DETAILED DESCRIPTION OF THE INVENTION

Referring to figures 1, 2 and 3, the dispenser of the present invention is shown generally at 30. Dispenser 30 has three stages, namely the first stage 32, the second stage 34 and the third stage 36.

15 The product 10 is stacked in the product hopper 27. The product 10 is typically card stock, paper stock or the like. The product hopper 27 is set at an angle to help maintain the product in a stack and to minimize the likelihood of the product falling backwards. The feed belt 1 and the upper and lower product drive belts 11, 12 of the first stage assembly of the dispenser are at the same angle. The upper and
20 lower drive belts 13, 14 of the second stage assembly of the dispenser are at a lesser angle and the upper and lower belts 15, 16 of the third stage assembly of the dispenser are generally level.

The drive mechanism starts at the main drive motor 4, with a belt drive 5, to the lower splined drive shaft 17. First and second stage splined drive shaft 17 is connected to the upper splined shaft 22, by means of a 1:1 belt drive 6. Belt drive 6 is also coupled to the feed belt drive shaft 20. Drive shaft 20, in turn, drives the feed belt drive pulley 3, which drives the feed belt 1. The drive belt 6 drives the upper product drive belts 11 of the first stage at the same speed as the lower product drive belts 12 of the first stage 32, but there is a step down to the feed belt drive shaft 20. This step down and the differing pulley sizes creates an increase in speed from the feed belt 1 and thus the speed of the first stage assembly. This speed up of belt speeds creates a larger gap between the products 10.

The drive splined shafts 17 and 22 also upper and lower drive belts 13, 14 of the second stage assembly of the dispenser. They are driven at the same speed as the first stage assembly of the dispenser.

The third stage assembly of the dispenser is driven by the main drive motor 4, via a belt drive 7. This speed up ratio drives lay shaft 28, which in turn, via belt drive 8, drives the lower splined shaft 18. Shaft 18 is connected to the upper splined drive shaft 23, by means of a 1:1 timing belt drive 9 of the third stage.

The speed up created by speed up belt drive 7, creates a larger space between the product being transferred from the first 32 and second 34 stages to the third stage 36 of the dispenser.

The photocells 25, 26 located in the third stage of the dispenser are used to monitor the position of each product and to adjust the speed of drive motor 4, to

dispense the products into the gaps of the subsequent conveyor or as required by the products on the subsequent conveyor 38. The first photocell 25 detects the presence of the product in the third stage and together with the second photocell 26 the gap between products is determined. The speed of the drive motor is adjusted up or down if the gap is smaller or larger than a predetermined preferred gap size.

Each of the stages of the dispenser share shafts for the drive of one stage and the idlers of the next stage. The purpose of having shared shafts between each of the stages is to create a continuous transport surface both upper and lower for the product.

The transport surface is now free from voids, which would occur when you have a separate tail and a drive shaft located next to one another. On an apparatus that had shafts adjacent to one another it would be possible to have jumper belts to fill the voids, but these jumpers take up space across the width of the dispenser, which also limits the size of product that can be handled in the relationship to the width of the dispenser.

Therefore the use of shared shafts not only enables shorter lengths of products to be handled it also enables smaller widths of product to be handled.

The use of splined shafts (shafts with grooves cut into the surface around the circumference) and splined bushings in the product drive belt pulleys allows for an easier set up and positioning of the drive belts for differing sizes of products.

Referring to figure 4 an alternate embodiment of the dispenser of the present invention is shown generally at 40. Dispenser 40 is generally the same as that

described above but the drive motor 4 is positioned such that it directly drives the drive shaft 23 of the third stage. This change serves to simplify the control system especially if the size of the product changes. Typically if the user wishes to change the size of the product, the user would change the size of the timing belt drive. If the motor is directly attached to the timing belt drive rather than the drive shaft of the third stage the control system has to be adjusted to accommodate the change.

Referring to figures 5, 6 and 7 a second alternate embodiment of the dispenser of the present invention is shown generally at 50. Dispenser 50 is similar to that of figure 4 in that the drive motor 4 is positioned such that it directly drives the drive shaft 23 of the third stage. Dispenser 50 has been adapted such that it can easily be adjusted to accommodate different sized product. Specifically dispenser 50 includes an interchangeable gear 52 that is secure with a pin 54. A pivot arm 56 with a pivot arm mating gear 58 attached thereto mates with interchangeable gear 52. Pivot arm 56 is attached to lay shaft gear 60. Lay shaft gear 60 is operably attached to drive motor 4 by way of timing belt 5.

It will be appreciated by those skilled in the art that interchangeable gear may be easily change. Specifically pin 54 can easily be removed and the gear 52 can be changed to a size to suit the particular job. Pivot arm 56 pivots mating gear out of engagement with gear 52 to allow it to be easily change. Once gear 52 has been changed pivot arm 56 easily pivots back into position and the gears are then in mating arrangement.

As used herein, the terms "comprises" and "comprising" are to be

construed as being inclusive and opened rather than exclusive. Specifically, when used in this specification including the claims, the terms "comprises" and "comprising" and variations thereof mean that the specified features, steps or components are included. The terms are not to be interpreted to exclude the presence of other
5 features, steps or components.

It will be appreciated that the above description related to the invention by way of example only. Many variations on the invention will be obvious to those skilled in the art and such obvious variations are within the scope of the invention as described herein whether or not expressly described.